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Buffalo Area Chamber of
Commerce. Canal...

Ship channel between
Lake Erie...

[Buffalo]

[1917]

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SHIP CHANNEL between Lake Erie and Lake Ontario

Report of the Canal Committee of the Chamber of Commerce, Buffalo, N. Y.

At the regular monthly meeting of the Board of Directors of the Buffalo Chamber of Commerce, held on Tuesday evening, May 8th, 1917, at 6:15 o'clock, the following report, submitted by the Canal Committee, reviewing the history of inland waterways projects in relation to New York state, Lake Erie and Lake Ontario, and discussing the project of a ship canal between Lake Erie and Lake Ontario as a political, naval or military necessity and as a commercial waterway, was presented and the resolution embracing the conclusions of the Canal Committee, as printed herein, was unanimously approved.

BUFFALO CHAMBER OF COMMERCE

A. A. LANDON,

President.

Attest:

GEORGE C. LEHMANN,

General Secretary.

1118 1/2, June 26, 17



Prepared by Henry W. Hill.

THE Canal Committee of the Buffalo Chamber of Commerce have had under consideration that provision contained in Section 2 of the Rivers and Harbors Act of Congress, approved July 27th, 1916, authorizing and directing the Secretary of War to cause a preliminary examination and survey for a waterway or ship channel along the most practical route between Lake Erie and Lake Ontario of sufficient capacity to admit the largest vessels in use on the Great Lakes and submit the following report:

The mandatory terms of the Act of Congress leave little that can be done at this late day, other than to call attention to some of the similar and other projects during the past two centuries, which were designed to establish navigable communication between Lake Erie and Lake Ontario. All such practical information may be useful in determining what the Federal government ought to do in the premises on the subject. This has necessarily extended the report beyond the mere conclusions of the committee.

The Niagara Ship Canal project is not a new one and is periodically reoccurring. A review of the acts of the state and Federal governments in relation to the matter, as it has hitherto been pressed for consideration, may aid the directors of the Buffalo Chamber of Commerce and others in determining whether or not the project is of sufficient importance to warrant the enormous expenditure of money necessary for its construction and operation.

Your committee has considered the subject of the Niagara Ship Canal under the following heads:

First: An historical review of the project,

Second: The project as a political, naval or military necessity,

Third: The project as a commercial waterway.

The history of the project for such proposed uses, however, is not chronologically consecutive and is necessarily more or less involved on account of the individual, corporate, state and Federal activities put forth for its accomplishment. That, however, does not preclude an historical review of such principal attempts hitherto made to secure such a waterway prefatory to the conclusions of the canal committee as hereinafter stated.

AN HISTORICAL REVIEW

In a report of a special agent of the French government, named Clerambaut d' Aigremont, dated October 18th, 1710, occurs the following in its English version:

"When I passed the portage at Niagara it did not appear to me that any communication between Lake Ontario or Lake Erie could be made that could avoid this portage, and if M. de la Mothe (Cadillac) knows a means of doing so, I think he is the only man in the country who does. But, My Lord, even if it were true that a communication with Lake Ontario or Lake Erie could be made, it could only be done with very great expense and it would not follow from that, that Detroit would be able to obtain from Montreal any help it might need in case of war with the Iroquois, for such help could not even be given to Fort Frontenac, which has to be passed through on the way to Detroit."

Prior to the surrender of Fort Niagara to the British on July 25th, 1759, the western part of the state was under the control of the French government and there is no record of any attempt to establish navigable communication between Lakes Erie and Ontario during that period, nor for the several decades thereafter.

It will be remembered that a trading post was established at Niagara as early as 1720, and that in the year 1721, there was the "beginning of a great trade with the Indians upon the Great Lakes," and that Cadwallader Colden, in his "Memorial Concerning the Furr-trade of the Province of New York," presented to Sir William Burnet, Captain-General and Governor of the Province under date of November, 1724, called attention to the water-carriage between the St. Lawrence, the Great Lakes and the Mississippi river with short land carriages between them.

In that remarkable memorial he also called attention to the advantages of the inland waterways of the state, extending from Albany to the country of the Senecas, over which goods and furs might be easily and economically transported and which he considered "more advantageous than the way the French were obliged to take by the great Fall of Jagara (Niagara), because narrow rivers are safer than the lakes, where they were obliged to go ashore, if there be any wind upon them."

The memorial is a lengthy and intelligent presentation of the advantages possessed by the Province of New York over the St. Lawrence route to the sea through the then French territory. To him may be ascribed the credit of being the first to point out the remarkable system of waterways in New York, which might easily be made to intercommunicate as was afterwards done. However, he did not suggest a navigable waterway between Lake Erie and Lake Ontario.

FIRST LEGISLATIVE ACT IN 1792.

In the extension of the routes and increasing volume of trade westerly from the Hudson to and beyond the Great Lakes during three-fourths of the eighteenth century, notwithstanding the general use of the lakes, rivers and streams of the Province as the principal highways of trade and travel, nothing was done to effect navigable communication between Lake Erie and Lake Ontario, though Sir Henry Moore, Governor of the Province, in 1768, proposed the construction of a canal around Little Falls on the plan of the Grand Canal of Languedoc in France to establish water communication between the Hudson and Lake Ontario. No details are obtainable of a reported canal survey around Niagara Falls in 1784.

The first legislative act of the state authorizing the construction of artificial canals to connect its natural navigable waters was chapter 40 of the laws of 1792. That act authorized the incorporation of the Western Inland Lock Navigation Company, for the purpose of opening a lock navigation from the Hudson to Lake Ontario and from the Three-River Point up Seneca river to the lakes of Western New York for boats of two feet draft, forty feet long and twenty feet wide, and fifteen years in time was allotted to the company for the construction of the entire works. That, however, did not provide for navigable communication between Lake Erie and Lake Ontario.

The first state law on the subject was chapter 92 of the laws of 1798 entitled, "An Act for Opening the Navigation Between Lake Erie and Lake Ontario," incorporating "The Niagara Canal Company," which company was authorized to lay out and survey the most practical route between the navigable waters of Lake Erie and Lake Ontario and to construct a canal by means of locks and other devices large enough to admit the passage of vessels 70 feet long, 16 feet wide and having a

draft of 4 feet. That company was given ten years to complete the project, but did nothing.

In 1808, a concurrent resolution of Assembly and Senate was adopted, authorizing an accurate survey of the rivers, streams and waters in the usual route of communication between the Hudson River and Lake Erie and such other contemplated route as the surveyor-general might deem proper and cause the same to be delineated on charts or maps for that purpose, one copy of which survey was to be filed with the Secretary of State and another copy was to be transmitted to the President of the United States.

James Geddes was appointed to make that survey and among the directions given him by the Surveyor-General, Simeon DeWitt, was "the ground between Lake Erie and Lake Ontario, which must be examined with a view to determine what will be the most eligible track for a canal from below Niagara Falls to Lake Erie and to have the level taken throughout the whole distance between the two lakes." Mr. Geddes made such survey from the outlet of Lake Erie down the rapids at Black Rock, where he estimated the fall at four feet seven inches and to the lower storehouse at Black Rock at six feet, thence to Schlosser's, a distance of eighteen miles, wherever he estimated the fall at nine feet and thence to Lewiston, where he estimated the fall at 317 feet and from Lewiston to Lake Ontario, a distance of six miles, he estimated the fall at two feet, making the entire fall from lake to lake 334 feet.

The Board of Engineers on Deep Waterways, with all their facilities for accurate measurements, in 1898, estimated the difference in mean levels of the two lakes at 330 feet, only four feet less than the estimate made by James Geddes earlier and that difference may have been due to high waters in Lake Erie when his measurements were made. He described the method of transporting salt and other merchandise from Lewiston over the Niagara portage eight miles to Schlosser's and thence by boat to the upper storehouse at Black Rock. The charge was 75 cents per barrel of salt and one dollar per barrel for other merchandise.

James Geddes suggested two routes for a sloop canal between the lakes, one crossing the Tonawanda creek on an aqueduct via Cayuga Island, across Gill creek to the brow of the mountain (Niagara escarpment) and the other via Gill creek, thence through a side cut to the Mills and to the top

of the mountain (Niagara escarpment). He proposed that both routes converge at the point and descend to the river through a flight of locks far enough to prevent great waste of water, "or," said he, "the vessels below might sail almost under the boats above, and the goods be drawn on *ways* up 315 perpendicular feet, by means of machinery wrought by the water which would run through the canal."

The first proposed route required an artificial cut from Lake Erie to Lewiston little more than 26 miles with very little rock and the second proposed route involved four miles more of rock cut than the first route had. At that time (1808) there were no wagon roads between Schlosser's and Black Rock and James Geddes was obliged to ride his horse across creeks and swim him over others. James Geddes also surveyed an interior canal route via Cayuga marshes, Mud creek, Tonawanda creek and Niagara river to Lake Erie.

INTERIOR ROUTE TO BE PREFERRED.

In his comparison of the Ontario with the interior route, he called attention to the argument, then insisted upon, in favor of the latter, namely, "that it would be bad policy in the United States to open a communication for sloops between Erie and Ontario, as the products of all the upper lakes would, on their passage to the ocean, come into Ontario and when there, the lockage to the tide in the St. Lawrence being only 206 feet, while it is 374 feet to the tide in the Hudson, there would be danger of the whole lake trade being diverted to a port in the territory of another nation. * * * * * The interior route to be preferred, as being free from the risk and uncertainty of the wind and wave" on Lake Ontario. (1 Canal Laws, 31.)

That argument is still relevant to the discussion of the policy to be adopted by the United States government and is being used with some force in opposition to the proposed Niagara Ship Canal.

In 1808, Albert Gallatin, Secretary of the Treasury, reported on a canal for sloop navigation around Niagara Falls at an estimated cost of one million dollars, but Congress took no action thereon.

In 1810, Senator John Pope of Kentucky introduced a bill in the Senate of the United States for many waterway projects, including a canal to pass the cataract of Niagara.

That failed of passage. At the same session of Congress, Hon. Peter B. Porter presented a resolution in the House of Representatives authorizing the appointment of a committee to examine into the expediency of appropriating public lands for the opening of roads and canals. Mr. Porter, as chairman of that committee, reported a bill for the improvement of roads and canals, among which was a provision "for opening canals from the Hudson to Lake Ontario and around the Falls of Niagara."

Cadwallader D. Colden reported in his Memoir that, in 1810, the Legislature was memorialized by many citizens in different parts of the state, that Canada was attracting the greatest part of our internal commerce in consequence of the facilities, which were offered by water communications, to transport commodities to her markets.

On March 18th, 1810, the State Senate adopted a resolution appointing seven (7) commissioners, including Gouverneur Morris and De Witt Clinton, to procure such surveys as to them shall seem necessary and proper in relation to inland navigation from the Hudson river to Lake Ontario and Lake Erie, which was concurred in by the Assembly on March 15th, 1810. On March 2d, 1811, the commissioners made their report to the Legislature. In that report, among other things, in response to the question: "Would it not be advisable to descend from Lake Erie into Lake Ontario, rather than encounter the difficulty and expense of building a canal from Lake Erie via the Cayuga marshes to the Hudson river?" the commissioners stated that they "believe it would not; * * * * it is sufficient to say that articles for exportation, when once afloat on Lake Ontario, will, generally speaking, go to Montreal, unless our British neighbors are blind to their own interests. * * * * It is probably that a good sloop navigation from above the galleys to Montreal would cost less than a good boat navigation from Oswego to Rome. The extent of this last, deducting the Oneida lake, is 56 miles; the fall is on an average near 40 inches per mile; the supply of water is doubtful and in 12 miles of the distance, obstacles almost insurmountable, present themselves."

Some of the principal reasons for a canal along the interior route were that its water supply might be largely drawn from Lake Erie for that part of the canal extending from Lake Erie to Montezuma and that some of the lakes of Central New York

might also be drawn upon as feeders for the canal in its middle and a part of its western division. The lowest point in its middle and western divisions of the proposed canal was at the proposed Seneca aqueduct, whose spillway afterwards constructed was 393 feet above tidewater, approximately 144 feet above the level of Lake Ontario, thus avoiding the 144 feet lockage down to Lake Ontario and then the 144 feet lockage up from that lake to the lowest level of any part of the Erie canal subsequently constructed, or, in other words, there was to be a saving of 288 feet in canal lockage via the interior route as compared with the Ontario route, and what is still more important on account of the limited water supply on the Rome summit level, as hereinafter stated, there would be the great saving in water required to operate such 288 feet of additional canal lockage. The Rome summit level is approximately 170 feet above the level of Lake Ontario. It would have been necessary to have overcome that elevation by locks had the Ontario route been selected for the original Erie canal.

TURNED COMMERCE OF THE UPPER LAKES.

After discussing the advantages of the interior New York State route over those of Ontario-St. Lawrence river route, the commissioners said that "It is evident that the canal will, if properly effected, turn to the United States the commerce of the upper lakes." That prophecy was abundantly fulfilled in the vast Great Lakes' tonnage over the Erie canal for three-fourths of a century after its completion in 1825.

The act to provide for the improvement of the internal navigation of the state passed April 8th, 1811, authorized Gouverneur Morris, De Witt Clinton and seven other commissioners to make application to the Congress of the United States and legislature of any state or territory to co-operate and aid in the undertaking of establishing canal navigation between the Great Lakes and the Hudson river.

Only the states of Tennessee, Massachusetts and Ohio instructed their representatives in Congress to favor the project. Michigan opposed the interior route, but favored a canal around the cataract of Niagara and another by the Falls of Oswego. The New York Commissioners inferred that decision was due to information not founded in fact, although President Madison sent a special message to Congress on the subject and a bill was introduced to appropriate four million

acres of land to the State of New York as soon as canal navigation be opened between Lake Erie and the Hudson river, 63 feet wide on the top, 45 feet wide on the bottom and 5 feet deep, for boats 60 feet long, 18 feet wide and drawing 3 feet of water. The committee, to which the bill was referred, failed to make a favorable report thereon. Various reasons were assigned for such non-action. From that time to the present, Congress has made no appropriation of lands or money towards the cost of the construction of any of the New York canals, nor of a Niagara ship canal. In their report, under date of March 14th, 1812, the commissioners opposed the Niagara-Ontario route for various reasons, one of which they stated as follows, that "Instead of drawing to us the trade of our neighbors it would turn much of our trade to them."

In their lengthy report are presented the facts that ultimately led to the adoption of the interior route instead of the Ontario route.

The Canal Commissioners reported again on March 8th, 1814, quoting with approval the statement of William Weston, the distinguished engineer, formerly employed by the Western Inland Lock Navigation, in substance that "the stupendous plan of uniting Lake Erie with the Hudson * * * * would insure the commerce of the immense extent of country bordering upon the upper lakes * * * * and would in its eventual consequences render New York the greatest commercial emporium in the world." Water might be taken for the canal from Lake Erie as far as Seneca river.

Again on March 8th, 1816, the Canal Commissioners reported, among other things, that "the route from Rome to the Seneca river * * * * would have the most immediate tendency to divert the trade from passing down the Oswego river to Lake Ontario and Montreal, to permit which would be improvidently to abandon to a foreign and a rival nation commercial advantages, which ages may not enable us to reclaim." That was the opinion of such Canal Commissioners and statesmen as Stephen Van Rensselaer, De Witt Clinton, Simeon DeWitt, Peter B. Porter, Thomas Eddy, Robert Fulton and Charles D. Cooper a century ago and is worthy of serious consideration in forecasting the results that may still follow from the construction of a ship canal between Lakes Erie and Ontario, for it will not be practicable to operate as economically a ship canal from Oswego to the

Hudson as down the St. Lawrence to the ocean. That was pointed out by William Weston in 1812. Further reference to the subject will hereinafter appear.

In the Memorial of the Citizens of New York in 1816, in favor of canal navigation between the western lakes and tide-waters of the Hudson, it is stated that "when a vessel once descends into Ontario, she will pursue the course ordained by nature. The British government are fully aware of this and are now taking the most active measures to facilitate the passage down the St. Lawrence."

For a time that settled the controversy. The argument then used applies with equal force to-day.

In November, 1816, a further appeal was made to Congress and to Ohio, Kentucky and Vermont (1 Canal Laws, 269) for aid, but Ohio, alone, responded, offering to co-operate if some feasible plan could be formulated agreeable to both states (1 Canal Laws, 280). The government of the United States was expected to appropriate lands or money (1 Canal Laws, 280, 285), but it failed to do so.

CORPORATION EFFORT WHICH FAILED.

In 1826, Nathan S. Roberts, the engineer in charge of the construction of the locks at Lockport and the Erie canal from Lockport to Buffalo in 1822 to 1825, was engaged by individuals to make a survey of a proposed ship canal around Niagara Falls. That was made for the purpose of securing a charter from the state for a corporation to build and operate such a canal. Mr. Roberts at that time made such a survey for a canal 60 feet wide at the surface, 36 feet wide at the bottom and 8 feet deep. Such a canal would be hardly large enough for the accommodation of war vessels of any considerable size.

The Utica Convention of 1834 memorialized the Legislature and Congress to construct navigable communication between Lake Ontario and the Hudson river and also between Lake Erie and Lake Ontario, primarily for commercial purposes and incidentally as a military defense, but the size of the waterway advocated by that convention would have been inadequate to admit war vessels of more than eight feet draft, thus showing that the argument as a political, naval or military necessity was made merely as an aid to secure the favorable action of Congress on a commercial project. Congress made no response to that memorial.

In 1835-6, Captain William G. Williams surveyed four routes for a ship canal from Lake Erie to Lake Ontario. One route was via Niagara river and Lewiston, and another via Niagara river, Gill and Four-Mile creeks to Lake Ontario, and another via Cayuga and the Twelve-Mile creek to Lake Ontario, and another via Niagara river, Tonawanda creek, Lockport and Eighteen-Mile creek. He estimated the cost of these at from $2\frac{1}{2}$ to 5 millions of dollars. He proposed to make locks 200 feet long, 50 feet wide, 10 feet deep, and the canal 110 feet wide at the surface. The locks were not to have a lift exceeding 10 feet with intermediate basins between the locks. He also urged its construction for military purposes as well as a commercial necessity.

House Document No. 174 of the 1st Session of the 24th Congress, bearing date March 2d, 1836, contains a topographical survey of the harbor at the Eighteen-Mile creek, made by Captain William G. Williams of the United States Topographical Engineers for the purpose of securing a channel 75 feet wide and 10 feet deep for a distance of 1,500 feet. In 1837, the Legislature of Ohio adopted a resolution relative to such a ship canal.

House Document No. 463 of the 2d session of the 25th Congress, dated January, 1838, is the report of the committee on roads and canals of the House of Representatives on a ship canal around the Falls of Niagara and contains a recital of the various efforts theretofore made by the state and national governments to establish such a navigable waterway between Lake Erie and Lake Ontario to accommodate the larger class of steamboats or vessels navigating Lake Erie and Lake Ontario. It was based upon and included the survey of Captain William G. Williams, made in 1835-1836.

A joint resolution was presented in the Assembly on February 15th, 1840, reading as follows: "That the consent of the Legislature is hereby given to the construction, by the Governor of the state, of a ship canal around the Falls of Niagara, and that the Senators and Representatives of this state in the Congress of the United States be requested to use their best efforts to procure the passage of a bill for this purpose." That was concurred in by the Senate on April 18th, 1840. Nothing, however, was done by Congress of the United States in relation thereto.

The Michigan Legislature presented a resolution to the

House of Representatives, under date of December 27th, 1849, directing its Senators and Representatives in Congress to use all honorable means in obtaining appropriations of money for the construction of a ship canal by the general government around the Falls of Niagara, uniting the waters of Lake Erie and Lake Ontario, both as a commercial necessity and a military expediency. The report (Senate Misc. Doc. No. 5, 1st Session, 31st Congress) was based upon the survey of Captain William G. Williams.

CONGRESS REFUSED TO AID PROJECT.

A corporation with a capital stock of \$5,000,000 was incorporated under chapter 595 of the laws of 1853, authorizing the construction of a canal from some point above Niagara Falls to some place below the Falls or on the shore of Lake Ontario to allow vessels of at least 500 tons burthen to pass through it. However, it was unable to proceed with the work, and the Legislature of Illinois, on February 28th, 1854, adopted a resolution, which was presented to Congress on March 21st, 1854 (House Misc. Doc. No. 36 of the 1st Session of the 33d Congress), reciting that:

"WHEREAS, A New York Company had been formed in 1853 to build a ship canal around the Falls of Niagara and was unable to proceed without the aid of national government, therefore be it

"*Resolved*, That the Representatives in Congress from the state of Illinois be instructed to favor and to make such grant of lands as they may deem just and necessary in aid of the completion, at as early a date as is practicable, a ship canal around the Falls of Niagara in accordance with the Act of the Legislature of New York upon that subject, passed July 1st, 1853." (See House Misc. Doc. No. 36, 1st Session, 33d Congress.) Congress took no action thereon.

In 1854, Charles B. Stuart and Edward Serrell reported on the proposed Niagara ship canal as follows:

"For this project various plans have been proposed and surveys made at different periods during the past half century."

The principal examination theretofore made was that of the late Captain William G. Williams, United States Topographical Engineer in 1835-1836, of which an able report was submitted to Congress with information as to the feasibility of the route. Their estimates were based upon the cost of a

canal of sufficient capacity to accommodate vessels then in use, which was not larger than would be necessary for thousand-ton canal barges.

On May 11th, 1858, a committee of the House of Representatives reported in favor of a bill granting lands to aid in the construction of the Niagara Ship Canal, basing their report largely on the survey of Captain William G. Williams of the United States Topographical Engineers, which survey was made in 1835, and upon the experience of the Western Inland Lock Navigation Company between Seneca Falls and Schenectady, and upon the joint resolution of New York, Ohio, Michigan, Indiana, Illinois and Wisconsin, and upon resolutions of Boards of Trade in Chicago, Detroit, Milwaukee, Racine and other western towns. This last Congressional report is a lengthy one and contains a résumé of some of the preceding steps taken to establish such waterway communication between those lakes. Its recital of facts is not entirely accurate and its recommendations do not appear to have been adopted. (See Reports of Committee of the House of Representatives, Vol. 3, 1857-1858.)

In 1862, Hon. Samuel B. Ruggles urged upon the Congress of the United States the construction of gunboat locks in the Erie and Oswego canals, which Congress declined to construct.

The National Canal Convention of 1863, in which Hon. Samuel B. Ruggles was a prominent member, favored the construction or enlargement of ship canals connecting the Great Lakes and the Atlantic ocean as of national, military and commercial importance with dimensions sufficient to pass gunboats, on the ground that they would furnish the most efficient means of protecting the northern frontier.

The State Senate Committee on Commerce and Navigation in January, 1864, reported in favor of the construction, by a corporation, of a ship canal between Lake Erie and Lake Ontario and in 1866 such a company was incorporated, though primarily for commercial purposes as will hereinafter appear.

In the Report No. 53 of the 3d Session of the 37th Congress presented by the select committee on the Niagara Ship Canal, dated March 3d, 1863, it is stated that "the project of the ship canal to connect the navigable waters of Lake Erie and Lake Ontario has for many years claimed the attention of the general government as one of conceded public utility and one whose construction is immediately connected with the military and commercial prosperity of the country."

FOUR ALTERNATE ROUTES PROPOSED.

In that report four different routes were proposed, one from Porter's storehouse on the Niagara river to a point below Niagara Falls near the village of Lewiston, the second starting from the same point as proposed route number one and terminating at the mouth of the Four-Mile creek on Lake Ontario, the third commencing at Niagara river, follows up Cayuga creek and across Lewiston ridge at Pekin and descends to the mouth of the Twelve-Mile creek and the fourth leaves Niagara river at the mouth of Tonawanda creek, intercepts the Niagara canal at Pendleton and follows the canal to Lockport and descends the ridge at Lockport and pursues the flow of the Eighteen-Mile creek to its mouth.

The committee expressed no preference as to either of these routes and reported that it ought to be left to the President of the United States, or officers appointed by him, to make a selection and designate a route. That report also states that "that the system of gunboat fighting upon our lakes, rivers and other waters has become so efficient and consequently was popular of late in our (civil) war, that the attention of Congress and the government is turned towards developing and extending it to a much larger and more perfect system and to give it still more efficiency."

See the Engineer's Report in House of Representatives report No. 53, page 8, of the 3d Session of the 37th Congress, dated March 3d, 1863, wherein are presented the reasons for the construction of such canal between the lakes as a political, naval, military and commercial necessity. In 1863, the State Engineer estimated the cost of locks 225 feet long, 26 feet wide and 7 feet deep, to pass gunboats through the Erie canal, at \$11,902,888.

The memorial of Horace H. Day, presented on March 3d, 1863, in favor of the Niagara ship canal, was referred to the committee on Naval Affairs and reported upon by that committee of the House of Representatives with the recommendation that the whole subject be indefinitely postponed. (See House Report No. 54 of the 3d Session of the 37th Congress, under date of March 3d, 1863.)

In 1863, surveys were made by Daniel Marsh, assisted by George D. Stillson, for a ship canal around Niagara Falls. That canal was to have had locks 275 feet long, 45 feet wide,

with chambers containing 12 feet of water. Those were identical in size with barge canal locks, except they were to be not quite so long. The cost of that canal, with single locks, was estimated at \$5,784,101 and with double locks at \$7,316,307. (See House Executive Document No. 61, 1st Session, 38th Congress.)

The memorial of the Legislature of Wisconsin, dated April 27th, 1864, addressed to the House of Representatives of the United States, favored a ship canal around the Falls of Niagara river and the importance of the Erie canal by the general government, as a work of national character and of great military and commercial importance. (Senate Misc. Doc. No. 110 of the 1st Session of the 38th Congress and dated April, 1864.)

On March 29th, 1864, President Lincoln commissioned Charles B. Stuart to examine into the matter of the improvement of the New York canals for the passage of gunboats from tidewater to the Great Lakes. His lengthy report is House Executive Document No. 61 of the 1st Session of the 38th Congress. That engineer adopted the views of other engineers and concluded that an ample supply of water might be obtained by the construction of additional feeders and reservoirs at an expense of from \$600,000 to \$700,000. He estimated the entire cost of the improvement at \$20,571,169.75 to \$22,289,085.13, conditioned upon the material used and character of the improvement. He added little to the information on the subject, other than direct attention to the feasibility of an additional and ample water supply for the Erie canal route, whose sources have been availed of in providing the water supply for the barge canal.

THIS QUESTION NEVER ANSWERED.

Josiah D. Hayes, Esq., in 1865, propounded the significant question: "Why do we need another ship canal from Lake Erie into Lake Ontario?" The one existing canal between those lakes, then as now, was the Welland. That question has never been affirmatively and satisfactorily answered and from that day to this no such canal has been undertaken, even though several charters have been granted therefor.

The Niagara Ship Canal Company was such corporation with \$6,000,000 capital, formed under chapter 772 of the laws of 1866, authorizing the construction of a canal 105 feet wide on the surface, 90 feet wide on the bottom and 13

feet with locks 275 feet long and 46 feet wide with the same optional termini as had the company, which was incorporated in 1853.

This last company was spurred on by a bill in Congress which "authorized the President, by proper engineers and agents, to enter upon and take possession of the lands and waters within the territory and jurisdiction of the state, exercise the right of eminent domain without the consent, and peradventure, against the will of the Legislature of the state, and transfer to a non-existing corporation all the immunities, privileges and franchises he may have acquired under its provisions."

In strongly opposing the passage of the bill in Congress, the Legislature declared in substance that the construction of the ship canal in question would injure New York, because * * * * the traffic of the Western States would pass down the St. Lawrence to the Atlantic ocean and that it was being advocated as a commercial enterprise rather than a military expedient. The bill did not pass the Senate and become a law.

Under that bill the Niagara Ship Canal Company was required to expend \$300,000 before it could receive the bonds of the United States, and it developed that such a canal would cost \$9,000,000 and that it would afford an outlet to the sea, but through the port of Montreal, rather than through the port of New York. That project also failed.

Neither the Detroit nor the Morris (Illinois) Convention of 1865 urged the waterway as a military necessity but as a direct route via the St. Lawrence river to the ocean.

That has been and still is the principal reason, actuating representatives in Congress from the Central States in their support of measures designed to effectuate ship canal navigation between Lake Erie and Lake Ontario.

The State Canal Board, in 1866, reported that one of the results of a Niagara ship canal would be the passage down the St. Lawrence to the ocean of the produce of the West and to that extent its diversion from New York. In that harbor are the merchant fleets of the world, whence the agricultural products and commodities, under normal conditions, find ready export to foreign markets at all seasons of the year, whereas the St. Lawrence route is befogged much of the time and choked with floating fields of ice and icebergs nearly half the year, rendering its navigation and the navigation of the

Gulf of St. Lawrence extremely hazardous, as nautical reports show.

In 1867 Lieut.-Colonel C. E. Blunt, Corps of Engineers, United States Army, made surveys of three routes from Schlosser's, on the Niagara river, about three miles above the Falls, to the river near Lewiston; one from Schlosser's to Lake Ontario, at mouth of Four-Mile creek, one to Wilson, on Lake Ontario, and one from Tonawanda to Olcott, at the mouth of Eighteen-Mile creek. The estimates were based on a canal 90 feet wide at the bottom, 125 feet wide at the surface, and 14 feet deep, with locks 275 feet long and 36 feet wide, with lifts of 15 feet and 16 feet, and varied from \$11,032,000 for the Lewiston line to \$12,893,000 for the Olcott line.

A memorial and report on the Niagara ship canal, formulated and presented by the executive committee of the Detroit Commerce Convention, held December 13th, 1871, is contained in the House of Representatives Misc. Document No. 22 of the 3d Session of the 42d Congress.

It is a lengthy document, containing a number of resolutions and memorials of several states, addressed to the Senate and House of Representatives, and a vast amount of material bearing on the subject of the proposed ship canal between Lake Erie and Lake Ontario. In that report it was conceded that by the construction of the Niagara Falls ship canal and the opening up of the proposed water route to the Atlantic ocean, the agricultural products of the West might pass down the St. Lawrence river and thence to Europe and thereby the trade and commerce of the city and state of New York would be very greatly damaged. That report also contains a partial summary of the efforts theretofore made to establish such water communication between Lake Erie and Lake Ontario, and concluded with the recommendation to Congress that a Niagara ship canal would establish cheaper rates of transportation between different sections of the country and more especially between the great food-producing states of the West and the Atlantic seaboard.

STATE'S COMMERCE WAS IMPERILLED.

In that convention one of the arguments advanced in favor of the Niagara ship canal, was that the St. Lawrence river was navigable for more days of the year than the existing Erie canal, thus inadvertently admitting that the St. Lawrence

route was preferred to the Erie canal route and that the commerce yearly tributary to the port of New York would find shipment largely through the port of Montreal. That convention was dominated by delegates from states outside of New York, but its recommendations had little or no effect upon the Congress of the United States.

In 1872, the Legislatures of Wisconsin, Michigan, Iowa and Ohio presented resolutions to Congress in favor of a Niagara ship canal. Michigan repeated its appeal in 1873 and 1874, and Wisconsin also the latter year.

In 1874, instead of acting affirmatively on those resolutions, Congress called for a report on the cost of the enlargement of the locks of the New York canals, to the dimensions stated in Col. Blunt's survey with prisms eight feet deep.

Major John M. Wilson of the Corps of Engineers of the United States Army estimated the cost of such lock enlargement on the Erie canal with a prism 7 feet deep at \$6,676,231 and with a prism 8 feet deep at \$8,173,506. He also estimated at the same time the cost of a canal from the Hudson to Lake Ontario with locks 185 feet long, 29 feet wide and 9 feet deep at \$25,213,857.

In 1884, Elnathan Sweet, State Engineer and Surveyor, suggested a plan for a ship canal 100 feet wide at the bottom and 18 feet deep across the state, following the route of the Erie canal, except swinging southward near Newark far enough to maintain an elevation sufficient to produce a continuous descending profile from Lake Erie to the Hudson river, without dropping as low as the Seneca river and then locking up to the Rome summit level and thereby prevent feeding the canal from Lake Erie farther east than the Seneca river.

Such an artificial channel would have been 270 miles long and there would have been 73 miles of Mohawk river canalized, 30 miles of narrow Hudson river channel and 123 miles of Hudson river of deep water. That would have required 25 locks of 22 feet lift to overcome the 555 of total lockage. The locks were to have been 450 feet long and 60 feet wide. He estimated the cost of the improvement of the Erie canal at from \$125,000,000 to \$150,000,000 and also including the Oswego canal at \$25,000,000.

The surface of the Seneca river at Montezuma is approximately 376 feet above tidewater, and the Rome level of the Erie canal is 429.8 feet above tidewater. The spillway of the

Montezuma aqueduct on the Erie canal is 393.012 feet above tidewater, so that it was necessary for canal boats navigating the Erie canal to lock up from that aqueduct to the Rome summit level, a distance of 36.6 feet. The barge canal at the Three-River Point has a surface elevation of 363 feet above tidewater, that being determined by the elevation of the crest of the new dam at Phoenix. The difference in elevation between the water surface of the barge canal at Three-River Point and at the Rome summit level (that being 420 feet above tidewater) is 57 feet, which is overcome by the three barge canal locks. The surface of the barge canal at Three-River Point is approximately 114 feet above the high-water elevation of Lake Ontario.

Profile maps, showing both a southerly and a northerly continuous descending canal from Lake Erie to the Rome summit level, were included in the State Engineer's Report for 1900.

REVISION OF SURVEYS AND ESTIMATES.

The River and Harbor Act of August 11th, 1888, authorized a revision of the surveys and estimates of Col. C. E. Blunt for a waterway around Niagara Falls sufficient to float merchant ships and ships of war drawing 20 feet of water.

Accordingly Carl E. Palfrey was designated to make the resurveys and estimates. However, he examined only two of the routes surveyed by Col. Blunt, namely, route No. 4 and route No. 5. Route No. 4 was known as the Wilson or Twelve-Mile creek route, extended from Twelve-Mile creek southerly and southwesterly to the Pekin road and thence to the valley of Cayuga creek to Niagara river. The whole distance was 18.35 miles and the canal was to have 18 lift locks and was estimated to cost \$24,201,550 with a prism 20 feet deep with single locks and to cost \$29,347,900 with a prism 20 feet deep with double locks.

Route No. 5, known as the Olcott or Eighteen-Mile creek route, extended from Olcott harbor on Lake Ontario 18 miles east of the Niagara river up the Eighteen-Mile creek to "the gulf," that being a remarkable gorge in the face of the cliff near Lockport and thence ascending the cliff by four lifts in close proximity and then by a succession of other lifts more or less separated, to the summit level of the mountain range and thence southwesterly to the Niagara river one mile north of the Tonawanda creek, the whole distance being 25.28 miles.

and was estimated to cost \$23,617,900. The locks were to be 400 feet long and 80 feet wide and the channel was to be 200 feet wide. (See Vol. 6, House Executive Documents, 1st Session, 51st Congress, 1889-1890, page 2,434.)

On April 14th, 1890, the House Committee on Railroads and Canals made its report (Report No. 1430, 1st Session 51st Congress) to which committee it was referred and House Bill, introduced by Sereno E. Payne of New York, directing the United States of America to make a ship canal around the Niagara Falls in the State of New York. In that report may be found some of the data already considered, but more especially excerpts from the survey of Captain William G. Williams in relation to the military and commercial advantages of the subject. It also contained a résumé of some of the other projects already discussed, without presenting anything new and many things that tended to show that it was impracticable to construct such a proposed inland waterway. It contained some information in regard to the commerce of the Great Lakes' region. In conclusion, the committee alleged that "distress and ruin was staring in the face of the people of the West. Unless they get relief in some way and from some quarter, disaster and bankruptcy must virtually overtake vast numbers of the smaller farmers in all parts of the country." Subsequent events refuted that prediction, but the declaration illustrates the futility of the statements made by those advocating a ship canal around the Falls of Niagara.

That report also contains the report of Captain Palfrey hereinbefore epitomized.

In 1890, William Pierson Judson of the American Soc. C. E. made a report (House Report No. 283 of the 1st Session of the 52d Congress) containing a map, profiles and revised estimates of a canal from Lake Erie to Lake Ontario. That was reported on again by the same engineer in 1896.

On April 8th, 1892, the House Committee on Railways and Canals submitted its report (House Report No. 1023 of the 1st Session of the 52d Congress) on a ship canal from the Great Lakes to the navigable waters of the Hudson river. In that report the committee say that "the point is to decide between improving the St. Lawrence canals or the Erie, either on its present lines or a modification of it. * * * * Only a detailed and carefully planned survey can fully settle the question, but there are several alternatives open." That

committee was disposed to favor a ship canal between Lakes Erie and Ontario. To its report were appended several statements of prominent citizens and engineers relative to some of the matters involved in the construction and operation of such a waterway.

PLAN OF THE OSWEGO ROUTE.

In the State Engineer's annual report for 1895, appeared a special report of Albert J. Himes, resident engineer, of the "Oswego Route." His plan contemplated a canal $182\frac{1}{2}$ miles long, from Oswego to the Hudson river. It was to have a bottom width of 100 feet and a depth of 20 feet and locks 450 feet long and 60 feet wide with huge elevator lifts—one at Cohoes being 130 feet high and another at Oswego about 65 feet high. Other lifts ranged from 10 to 27 feet. He estimated its cost at \$82,098,601.

On February 18th, 1896, the House Committee on Railways and Canals submitted its report on a ship canal from the Great Lakes to the navigable waters of the Hudson river, found in House Report No. 423 of the 1st Session of the 54th Congress. It dealt largely with the commercial aspects of the project and had appended lengthy statements of prominent citizens and engineers in relation to some of the problems involved in constructing such a waterway.

In 1896, William Pierson Judson, a civil engineer, surveyed a route for a ship canal from Oswego to the Hudson, a distance of 179 miles. He planned to ascend the Rome summit level 172 feet above Lake Ontario, by several locks of 24 feet lift or to excavate for 11 miles through the Rome summit level, down 24 feet and to make both east and west thereof a lesser cut, reducing the summit level to 148 feet above Lake Ontario in case the supply of water for the Rome summit level were inadequate. He also proposed an enormous cut 50 miles long with a maximum depth of 100 feet and an average depth of 60 feet, making Oneida lake the summit level, which was 394 feet above tidewater. That route through the Mohawk valley encountered many obstacles and required the construction of many dams. Much dredging was required "in the Upper Hudson, estimated at \$20,000,000. He supplied a map and profile for his proposed ship canal. He had prepared a report prior thereto in 1892 for the Oswego Board of Trade on an enlarged waterway between the Great Lakes and the Atlantic seaboard."

In December, 1896, Major Thomas W. Symons reported in House Document No. 231 of the 2d Session of the 54th Congress on the radical enlargement of the Erie canal and enlarging one tier of locks to dimensions large enough to admit of the passage of torpedo boats and vessels of war, but Congress took no action.

On January 30th, 1897, the Secretary of War transmitted to the House of Representatives a report from the chief of engineers on the matter of widening the locks of the Erie and Oswego canals contained in House Document No. 231 of the 2d Session of the 54th Congress. That plan contemplated locks 250 feet long, from 25 to 37 feet wide, having lifts from 9 to 11 feet. The estimated cost thereof ranged from \$3,840,000 to \$5,398,000.

On July 15th, 1897, the Secretary of War transmitted to Congress a preliminary examination for a ship canal from the Great Lakes to the navigable waters of the Hudson river, made pursuant to section 8 of the Rivers and Harbors Act of June 3d, 1896, directing the Secretary of War "to cause to be made accurate examinations and estimates of cost of construction of a ship canal by the most practicable route, wholly within the United States, from the Great Lakes to the navigable waters of the Hudson river of sufficient capacity to transport the tonnage of the lakes to the sea."

The appropriation made for that purpose specified in the act last mentioned was insufficient to make such a complete survey as that proposed, and the chief of engineers interpreted the act to contemplate merely a preliminary survey.

Major Thomas W. Symons of the Corps of Engineers of the United States Army was assigned to that work. His report fills a hundred pages of House Document No. 86 of the 1st Session of the 55th Congress. It includes a general survey, not technical, of what Major Symons denominates three possible routes for a ship canal entirely within the United States, from the Great Lakes to the navigable waters of the Hudson river, namely:

(1) The Oswego route, (2) The Erie Canal route and (3) The St. Lawrence-Champlain route.

Only the first and third of these contemplated a ship canal between Lakes Erie and Ontario. If that were to be constructed, Major Symons preferred the line of route from Niagara river near Tonawanda to the Eighteen-Mile creek,

entering Lake Ontario, a distance of 25 miles, and having a fall of 320 (330) feet, accomplished by 13 locks of an average lift of 24 feet.

BARGE CANAL ROUTE PREFERRED.

Major Symons did not advocate either the proposed Oswego-Oneida-Mohawk route or the Ontario-St. Lawrence-Champlain route. Of those two routes, he preferred the former, but did not consider that as advantageous as a barge canal along the route of the Erie canal from Lake Erie to the Hudson river. He disapproved of the St. Lawrence-Champlain-Hudson route, remarking that "Canada was making every possible effort to deflect American commerce to its ports." He also reported that "the building of a ship canal by the St. Lawrence route (and that will now apply to the Oswego route) would be still further and more completely opening the doors of the lake commerce to the subsidized fleets of Great Britain and Canada." He strongly urged the improvement of the Erie canal to such dimensions as to admit of the passage of barges carrying 1,500 tons as the best solution of the best type of waterway between the Great Lakes and the Hudson.

The report of the United States Deep Waterways Commission is found in House Document No. 192 of the 2d Session of the 54th Congress, transmitted to the President of the United States on January 8th, 1897. The Commissioners were James B. Angell, John A. Russell and Lyman E. Cooley.

That Commission recommended that complete surveys and examinations be made and all needful data to mature projects be procured for: (a) Controlling the level of Lake Erie and projecting the Niagara ship canal; (b) Developing the Oswego-Oneida-Mohawk route; (c) Developing the St. Lawrence-Champlain route; (d) Improving the tidal Hudson river; (e) Improving intermediate channels.

The report is an exhaustive one, but is lacking in technical information. It is based largely on lay data and served as a preliminary report leading up to the report of the Engineers on Deep Waterways in 1900.

Pursuant to the recommendations of the Deep Waterways Commission last hereinbefore mentioned, the act of Congress approved June 4th, 1897, appropriated moneys and Major Charles W. Raymond of the Corps of Engineers of the United

States Army, Alfred Noble and George Y. Wisner, on July 28th, 1897, were designated to make "surveys and examinations (including estimates of cost) of deep waterways and the routes thereof between the Great Lakes and the Atlantic tidewaters as recommended by the report of the Deep Waterways Commission."

The act of July 1st, 1898, made a further appropriation for continuing the work for a waterway of 21 and 30 feet deep respectively and the relative advantages thereof.

Mr. C. L. Harrison, C. E., was placed in charge of the surveys for 21 and 30 foot waterways between Lakes Erie and Ontario.

Two routes were surveyed for a 21-foot canal and for a 30-foot canal, namely, the LaSalle-Lewiston route and the Tonawanda-Olcott route. The surveys included, for a 21-foot waterway, locks 600 feet long and 60 feet wide and for a 30-foot waterway, locks 740 feet long and 80 feet wide. The LaSalle-Lewiston route was to have one lock of 8 feet lift and six locks of 40 feet lifts and two locks of 39.4 lift and a channel 600 feet wide. It was estimated that the LaSalle-Lewiston route canal, which was 21.7 miles long of 21 feet in depth, would cost \$43,214,344, and of 30 feet in depth would cost \$75,084,453, and that the Tonawanda-Olcott route canal, which was 32.4 miles long of 21 feet in depth, would cost \$49,274,894, and of 30 feet in depth would cost \$77,221,353.

None of these estimates included any allowance for anything except for proposed channels between Lakes Erie and Ontario. The differences in elevation is 330 feet. The draught on the waters of the upper Niagara river to operate the nine locks, with chambers from 600 to 740 feet in length, from 60 to 80 feet in width and from 61 to 70 feet in depth, for the passage of vessels through a canal of that lockage might be felt as far as Niagara Falls and would necessitate the construction of a barrage across the outlet of Lake Erie to maintain its normal level. The engineers estimated the entire cost of the proposed 21-foot waterway through to the Hudson river at \$206,358,000, and of the proposed 30-foot waterway at \$317,284,500. That was on June 30th, 1900. Since that date the cost of labor and material has so increased that the foregoing estimates are longer no reliable as indicating the cost of such a work. It may safely be assumed that a 21-foot waterway via the LaSalle-Lewiston route would cost

not less than \$53,000,000, and via the Tonawanda-Olcott route not less than \$60,000,000. That amount would be required to construct the Niagara ship canal, and when completed, would tend to divert commerce away from the port of New York to the St. Lawrence river route through the port of Montreal to foreign markets, as there is only one natural outlet to Lake Ontario and that is down the St. Lawrence river. Hereinafter it is pointed out that the physical obstacles to the construction and operation of a ship canal from Lake Ontario, via Oneida lake and the Mohawk river to the tide-waters of the Hudson river, are such that no one is bold enough to predict that such a project will ever be undertaken and especially not since the completion of the Oswego barge canal.

BARGE CANALS THE BEST TYPE.

Prof. William H. Burr of Columbia University wrote Gen. Francis V. Greene, chairman of the Roosevelt Committee that proposed the barge canals, that they were the best type of waterways to transport the tonnage passing between the Great Lakes and the Hudson river, that "the cost of a ship canal, ranging as estimated from \$200,000,000 to \$500,000,000, is sufficiently formidable to exclude that solution from serious consideration."

The Roosevelt Commission of 1900, in its well-considered report, stated that "The State of New York must be prepared to face * * * a serious competition in the export trade over the St. Lawrence route" and that Commission said further: "It seems to us that there are certain insuperable difficulties in the way of such a canal (ship canal around Niagara Falls to Lake Ontario and from Oswego via Oneida lake and the Mohawk to the Hudson) ever being a success, no matter by whom constructed. It is intended to be used by a vessel which can navigate the ocean, the canal and the lakes. We do not believe that such a vessel can be constructed so as to be economically and commercially successful. The ocean steamer is built to withstand the fierce storms of the Atlantic and costs, in its most modern type, about \$71 per net ton of carrying capacity.

"The vessel to navigate the lakes is built to withstand less frequent and dangerous storms; it has less draft on account of the smaller depth of the harbors on the lakes and it is built much less substantially; its cost is about \$36 per net ton of carrying capacity.

"The cost of a canal fleet, consisting of a steamer and three consorts, with a total cargo capacity of 3,900 tons, according to figures furnished us by boat builders, would be \$28,500, or \$7.31 per ton.

"We have, then, the difference in first cost between \$71, \$36 and \$8 per ton of carrying capacity for the three types of vessels which, in the evolution of business, have been produced as the most economical for the particular class of work each has to do. We do not believe it is possible to combine these three types into one vessel, which will be as economical for the through trip, as to use the three existing types with two changes of cargo, one at Buffalo and one at New York, or to use the boat of 1,000-tons' capacity going through from the lakes to New York and three transferring its cargo to the ocean steamer."

In 1900, Hon. Edward A. Bond, State Engineer, reported that he "caused estimates to be made for canals around Niagara Falls as a part of the barge canal project on the basis of 11 feet depth in the locks and 12 feet depth in the waterways." He also caused a survey of the Olcott-Lockport-Buffalo route to be made in 1900, beginning at the mouth of the Eighteen-Mile creek and proceeding to the head of "the gulf where it was to unite with the Erie canal, the elevation of whose surface was 570 feet above tidewater. That elevation from Lake Ontario was to be reached through nine locks with lifts ranging from 28.7 to 40.4 feet each. The locks were to be of barge canal dimensions. Mr. Bond also caused a survey of the Lewiston-LaSalle route for the barge canal. The total lift was said to be 319.6 feet, but that was taken from survey of the United States Board of Engineers on Deep Waterways and may not accord exactly with other measurements, as at times there was more or less fluctuation in the upper and lower Niagara river levels and the termini of different surveys did not always coincide. The Bond surveys, however, were for barge canal purposes and not for a ship canal around Niagara Falls.

In the *Forum* for March-August, 1900, being Vol. 29, page 203, Major Thomas W. Symons said: "That a ship canal via Ontario, the St. Lawrence and Lake Champlain would certainly be a detriment to our inbound and outbound foreign commerce, tending strongly to divert it from the port of New York down the St. Lawrence river through the port of Mon-

treal. It would only be necessary for Canada to build a short canal to connect up with the Niagara ship canal to Lake Ontario and that the Canadians would certainly do. Since that date they have decided to enlarge the Welland and that will lead to the enlargement of the remaining short canals to the tidewaters of the St. Lawrence."

Major Symons strongly advocated the barge canal on account of its economic advantages as a highway and its adequacy to meet the demands of commerce at the least expenditure of money in construction and operation. Major Symons, on other occasions, has pointed out the menace to the commerce of the state in the proposed Niagara ship canal that would divert such commerce down the St. Lawrence to the sea.

UNOFFICIAL DOCUMENTS ON PROBLEM.

The foregoing historical summary does not include such unofficial reports as the paper of Joseph Mayer, published in the October (1900) proceedings of the American Society of Civil Engineers, entitled: "Canals Between the Lakes and New York," nor the paper presented at the same time by George Y. Wisner, one of the Board of Engineers on Deep Waterways and published in the same proceedings, entitled: "The Economic Dimensions for a Waterway From the Great Lakes to the Atlantic," nor the papers of Edward P. North of New York, J. Y. McClinton of Rochester, John Patten and many others, who at various times have suggested a waterway between Lake Erie and Lake Ontario, or between the Great Lakes and the Hudson river for commercial or power purposes. The latter purpose has much force on account of the possibilities of great power development in the 330 feet fall of water from Lake Erie to Lake Ontario and on account of that fall, such a waterway ending in Lake Ontario and with nine locks, most of which must have 40 feet lifts, as has already been shown, would not prove a commercial success in comparison with the barge canal, extending from Buffalo to the Hudson river with only one elevation to overcome and that of only 57 feet by three locks in the 42.35 miles between the Three-River Point and the Rome summit level. With that exception the barge canal is a continuous descending waterway from Lake Erie to the Hudson river, a distance approximately of 345 miles.

Some of the early memorials presented to the Congress of

the United States in advocacy of a ship canal around the Falls of Niagara are startling in the dangers predicted as likely to occur to this country in case that waterway were not constructed and they may now be read with amusement.

One of these memorials, prior to 1836, contained the following: "Your memorialists respectfully represent that if again our country should be visited by the calamities of war, the inhabitants alone on the northern frontiers are likely to be brought into immediate contact with its evils. They would respectfully ask the attention of your honorable House to the extraordinary augmentation of power, population, wealth and resources of the British North American possessions during the past few years."

Since that time the state of New York alone has outpopulated all the Canadas and the United States has become a world power and is allied with Great Britain in all that makes for our common civilization.

Many of the arguments advanced for such a ship canal are predicated upon inaccurate statements of facts as misleading, as the dissolving "aery shapes," that

" * * * Fancy, with her dream-dipped brush, * * * " may project, when the cold, calculating, reasoning powers are dormant.

Such arguments were refuted in their day by Jesse Hawley, Josiah D. Hayes, Hon. Israel T. Hatch, Hon. Harmon S. Cutting, Robert Hadfield, Hon. James M. Humphrey, Hon. Franklin A. Alberger, William Thurstone, Major Thomas W. Symons and others, whose devotion to the commercial development of the Empire State is attested by many imperishable achievements. But it appears that each succeeding generation must travel again the well-worn way, blazed a century and a half ago, and learn from experience what others have repeatedly declared, in substance, that a ship canal between Lakes Erie and Ontario is neither a political, naval, military nor a commercial necessity, and if it were constructed and used, it would tend to divert the commerce of the United States away from New York, Pennsylvania, New Jersey, Massachusetts and other Atlantic states down the St. Lawrence river to the sea. The St. Lawrence is nature's outlet of Lake Ontario and that river, rather than the Hudson, would become the great commercial highway between the Great Lakes and the Atlantic ocean.

NEITHER POLITICAL, NAVAL OR MILITARY NECESSITY.

We will next consider briefly another aspect of the matter. The project as a political, naval or military necessity. Much has already been stated on this branch of the subject. It has been one of the favored arguments of those, who had other interests to promote, or to serve, that the Niagara ship canal was a political, naval or military necessity.

They believed that such an argument would appeal to the political impulses of members of Congress far enough removed from the *locus in quo* as not to know the real conditions existing in and about the Great Lakes and the difficulty of constructing and operating a ship canal between Lake Erie and Lake Ontario and the uselessness of such a waterway for political, naval or military purposes. Those urging its construction on that ground may not recall the terms of the Rush-Bagot Treaty, concluded in 1817, and ratified in April, 1818, between the United States of America and Great Britain, whereby the contracting powers limited themselves on Lake Ontario to one vessel not exceeding 100 tons burthen and armed with one eighteen-pound cannon and on the Upper Lakes to two vessels of like tonnage and armament. That treaty is not likely to be abrogated and until it be abrogated or modified there is no need of a ship canal between those lakes as a political, naval or military necessity.

The proposed Niagara ship canal has not been generally favored by the people of this state, though at a state convention held in Utica on September 11th, 1834, such a canal was advocated, among other reasons as a military defense, and in 1862, chapter 415 of the laws of that year was enacted "to adopt the canals of this state to the defense of the northern and northwestern lakes." The first section of that act provided that:

"SECTION 1. Whenever the government of the United States shall provide the means, either in cash or their six per cent stock or bonds, redeemable within twenty years, for defraying the cost of enlarging a single tier of locks, or building an additional tier in whole or in part upon the Erie and the Oswego canals, including any necessary alteration of said canals, or their structures, to a size sufficient to pass vessels adequate to the defense of northern and northwestern lakes, the Canal Board shall, without delay, put such work under contract, in the manner now required by law, to be constructed

and completed at the earliest practicable period, without serious interruption to navigation, with power, in the discretion of the Canal Board, to direct the construction of new and independent locks, when found more advantageous. The said Canal Board shall, whenever the government of the United States shall provide the means as aforesaid, construct a canal of the requisite dimensions and capacity, from the Erie canal, at or near the village of Clyde, to some proper point on the Great Sodus bay, or Lake Ontario."

Section 6 of that act prohibited the state from contracting any debt for that purpose. Hon. S. B. Ruggles was sent to Washington to procure funds for the improvement, estimated by the State Engineer to cost \$4,451,000, and a bill was introduced in Congress in 1862 and again in 1863 and another in 1865, but Congress refused to make an appropriation for that purpose. It was said at the time that the only votes for such a waterway were given by some members of Congress "on the ground that this ship canal would give a continuous water communication with the Atlantic."

PROJECT PLEASING TO CANADIANS.

It was said by Hon. Franklin A. Alger, in 1872, that such a "ship canal project was hailed with delight by the Canadians," * * because "the artificial navigation necessary to reach Montreal from Lake Ontario was only forty miles, * * . The Bank of Montreal, to meet the emergencies of commerce, had established a branch in Chicago with agencies at other points and was making advances on property consigned to Great Britain. The Canadians are our active rivals." The Board of Trade of Chicago memorialized the Governor-General of Canada as follows:

"The interior of North America is drained by the St. Lawrence, which furnishes for the country bordering upon the lakes a natural highway to the sea. Through its deep channel must pass the agricultural productions of the vast lake region. The commercial spirit of the age forbids that international jealousy should interfere with great national thoroughfares, and the governments of Great Britain and the United States will appreciate this spirit and cheerfully yield to its influences."

"The great avenue of the Atlantic, through the St. Lawrence, being once opened to its largest capacity, the laws of trade, which it has never been the policy of the Federal government

to obstruct, will convey the commerce of the Northwest through it."

The foregoing resolutions reflect the sentiments of the people of the Central States on this project and show conclusively that they have always favored it as a commercial highway rather than as a political, naval or military necessity.

In 1865, the Legislature of the state adopted, among others, the following resolutions in relation to the bill then pending in Congress, authorizing the construction of a ship canal around Niagara Falls, namely:

"And Whereas, There is a bill now pending in the Congress of the the United States, authorizing the construction of a ship canal, under the auspices of the government of the United States, around the Niagara Falls, within the territorial jurisdiction of this state and committing the construction of the said work to any corporation created by any state in the Union, no matter whether the assent of this state may or may not be given thereto, and authorizing such corporation to levy and collect tolls upon vessels and tonnage passing through the said canal, except on vessels and tonnage of the United States, and pledging the funds of credit of the United States to the sum of six millions of dollars toward the expense of constructing said work;

"And Whereas, The power of Congress to exercise any jurisdiction of this character over the territory of a loyal state should depend upon a present imminent impending 'military necessity,' and not one that is or may be wholly and entirely contingent and remote—a military necessity that may or may not arise or exist between the United States and a coterminous foreign territory, should not be urged or relied upon to uphold a measure of this description.

"And Whereas, In the judgment and opinion of this Legislature, the said measure is promoted and advocated more as a commercial enterprise than a military expedient, therefore,

"Resolved (if the Senate concur), That this Legislature do most earnestly but respectfully remonstrate against the passage of the aforesaid bill by Congress, or any other bill of a like character whereby any commercial rivalry shall be created upon the territory of this state and within its jurisdiction, antagonistic to the present commercial status of the state, and highly injurious to our canal finances and the material interests of the people of the whole state."

In his report for the year 1865, the auditor of the Canal Department, in commenting upon the subject, said, "The military necessity no longer exists."

APPEALS TO CONGRESS UNAVAILING.

The appeals to the Congress of the United States, commencing as early as 1811 and repeated several times thereafter, for Federal aid to establish water communication between Lake Erie and the Hudson river were unavailing, even though the United States fully understood all the grounds therefore, including those of the alleged political, naval or military necessity for such a waterway. Later appeals for like aid to establish such communication, after the state, at its own expense, had established it, were also unavailing and no Federal aid was ever given.

The Congress of the United States did not consider such a waterway a political, naval nor a military necessity and up to the present time has withheld its support, while the state has been allowed, without any assistance from the Federal government, to go forward with its waterway construction and operation at an authorized expenditure to the taxpayers for the barge canals and terminals alone of \$154,800,000.

The Deep Waterways Commission, in its report transmitted to Congress on January 18th, 1897, did not conclude among its recommendations for a ship canal from the Great Lakes to the Hudson that such a canal was a political, naval or military necessity between Lake Erie and Lake Ontario. Evidently that purpose did not occur to or make any impression upon that distinguished commission, charged with the responsibility of reporting on a ship canal between the Great Lakes and the Hudson, notwithstanding the numerous congressional memorials, petitions and reports, calling attention to the matter prior to 1896. The silence of the Deep Waterways Commission on that important subject is significant and clearly indicates that the Commissioners did not predicate their report on the various arguments theretofore presented for a ship canal between Lake Erie and Lake Ontario as a political, naval or military necessity. In fact the Federal government has never considered a Niagara ship canal as a political, naval or a military necessity. Therefore it has made no appropriation for the construction of such a waterway, though several surveys have heretofore been made.

The provision in the Sundry Civil Act of Congress of June 4th, 1897, was "for surveys and examinations (including estimates of costs) of deep waterways and routes thereof between the Great Lakes and the Atlantic tidewater, as recommended by the report of the Deep Waterways Commission." In their comprehensive survey, the army engineers, in substance, reported that in time of war, the large ships of war would be required on the high seas and such vessels would be unnecessary on the Great Lakes and that both a 21-foot and a 30-foot channel would be ample for naval defense, the Canadian harbors and channels at that time admitting vessels of only 14 feet draft. The survey, however, for a ship canal from Lake Erie to tidewater was advocated primarily for commercial and not for political, naval and military purposes.

The conditions of modern warfare, with submarines destroying merchant and other ships and aircraft sweeping battlefields and the sea, are such that ship canals are of little value and, in fact, they may be a menace to interior regions, exposed as would be those states bordering on the Great Lakes to the ravages of vessels of war sailing up the St. Lawrence river into Lake Ontario and thence through a ship canal into the upper lakes.

It is not at all likely that the government of the United States would appropriate enough money to construct a ship canal as large as the improved Welland canal is to be. That is 25 miles long, from 200 feet to 210 feet wide on the bottom, 25 feet deep in the prism and 30 feet deep in its seven locks, 800 feet long, 80 feet wide, each having a lift of $46\frac{1}{2}$ feet and the entire waterway improvement costing many millions of dollars.

NO MILITARY OR NAVAL VALUE.

Any ship canal in the territory of the United States between Lake Erie and Lake Ontario of smaller dimensions than those of the Welland canal would not suffice for the passage of war vessels or other large lake vessels. Furthermore, little would be gained by making those lakes intercommunicate through a waterway having a total lockage of 330 feet in a distance not exceeding 60 miles, with the entrance to the lower lake, from the ocean, under the control of the British government, as are the St. Lawrence river and the Gulf of St. Lawrence. It is not apparent in what manner such a ship canal around the Niagara Falls would or could be of naval or military ser-

vice to the nation in time of war, which is as improbable now as it has been for the past century.

Engineers of the army of the United States have not advised the construction of the Niagara ship canal as a political, naval or military necessity, nor have they reported that such a waterway could be successfully operated. They realize the difficulty of navigating large lake vessels, now even larger than those in use when the Board of Engineers on Deep Waterways made their surveys in 1898-1900, through a narrow, restricted channel up and down a flight of six or more locks, that must be at least 650 feet in length and from 65 to 80 feet in width and having 40 feet lifts to overcome the so-called mountain elevation of approximately 300 feet at Lewiston or at Lockport, in addition to the other locks required to overcome the 330 feet differences in elevation between the two lakes. Who can foretell the possible mishaps to war vessels navigating a waterway of such unusual lockage?

There is no such canal in operation anywhere in the world and it is not likely that the government of the United States is disposed to experiment in a matter involving such an expenditure of money as the construction of the proposed ship canal from Lake Erie to Lake Ontario would necessitate. In addition to the cost of construction will be involved many expenses incidental to operation and the paramount problem of obtaining an ample water supply.

The Board of Engineers on Deep Waterways concluded that in order to maintain the level of Lake Erie at a regulated stage of 574.5 feet above tidewater and thereby secure a maximum discharge of 277,270 cubic feet per second, in part required to supply the proposed Niagara ship canal, it would be necessary to construct regulating works, consisting of a barrage with openings, or a submerged weir 2,900 feet long with 13 sluices, each having an opening of 80 feet in the clear, across the outlet of Lake Erie, or to construct regulating works across the Niagara river between Tonawanda, in case a ship canal were to be constructed between Lake Erie and Lake Ontario, for such a canal could not be operated without the lake levels being so maintained. The expense involved in such a structure and possible damage to property are more or less problematical, but they must be considered in estimating the cost of such waterway. The diversion of water from Lake Erie is regulated by treaty with Great Britain.

The Suez, the Cronstadt, the Corinth and the Kaiser Wilhelm are all sea level ship canals without locks, but may have tidal gates. Ships sail through them without lockage.

The Manchester ship canal is $35\frac{1}{2}$ miles long with summit level 60 feet above tidewater, which is approached by four sets of locks each of 15 feet lift.

PANAMA A SMALLER UNDERTAKING.

The Panama canal is approximately 40 miles long from Limon bay in the Atlantic to La Boca bay in the Pacific and its regulated summit level is between 82 feet and 87 feet above sea level and is approached by a flight of three double locks on the east and three separate double locks from the west. The entire lift from either ocean to the summit level does not exceed one-third of the lift from Lake Ontario to Lake Erie and only one-half the lift from Lake Ontario to the Rome summit.

The new Welland is incomplete and it is too early to predict what its operation for large lake vessels may demonstrate, if the improvement be completed as planned.

The proposed Georgian bay ship canal is to be 440 miles in length, of which 108 miles will require excavation, leaving 332 miles of natural river or lake channels. Its summit level is 99 feet above Georgian bay and 659 feet above tidewater at Montreal. To overcome that summit level 27 locks will be required, ranging in lift from 5 to 50 feet, with chambers from 650 to 800 feet in length and from 65 to 75 feet in width, with 22 feet of water over miter sills. Most of the proposed locks have lifts not exceeding 30 feet and not more than four of them are in close proximity. Only one has a lift of 50 feet. But the suggested lockage on the proposed Georgian bay ship canal is so distributed with long intervening reaches between locks, that it presents far fewer difficulties to navigation than either the proposed Niagara ship canal or the improved Welland, whose successful operation and navigation by large lake vessels, if completed, is regarded as more or less problematical. Though, as a matter of engineering, it be possible to construct such a waterway, there still remains the problem of obtaining an ample supply of water for its operation and the uncertainty of its success as a commercial highway. It is not needed as a naval or military waterway, so that argument ought not longer to be seriously made in advocacy of its construction.

United States war vessels could not descend the Canadian canals and the St. Lawrence river, but they would be confined or bottled up in Lakes Ontario and Erie and other Great Lakes, unless a ship canal were built via the St. Lawrence-Champlain-Hudson route, or via the Oneida-Mohawk-Hudson route to the deep waters of the Hudson river, involving the locking up from Lake Ontario 133.6 feet to the so-called low-summit level 40.833 miles long, extending from Fulton, lengthwise across Oneida lake and up Wood Creek valley $5\frac{1}{2}$ miles east of Sylvan beach. The surface of such low-summit level in that route was 379 feet or approximately above tidewater. Oneida lake was designed to constitute its principal storage reservoir, although other storage reservoirs were to be constructed in the valleys of Salmon and Black rivers. That route, as surveyed by the Board of Engineers on Deep Waterways, involved a long cut easterly from Oneida lake through Utica shale, rock, hardpan and a sand ridge, which cut at one place was 84 feet deep and would be subject to land slides, unless thoroughly drained. That route was estimated to cost \$1,678,000 more than the cost of the high-summit level project between Oneida lake and the Mohawk river. The elevation of the latter was 416 feet above tidewater and required the locking up from Lake Ontario 170.6 feet. The Board of Engineers said: "In both of which projects the water to generate power for operating the locks and for locking ships across the divide must be secured by storage in reservoirs located on the watershed or on adjacent watersheds.

"The lockage required to cross the divide with the low-level project will be 267 feet and for the high-level project 341 feet, making the route expensive to construct and slow to navigate.

* * * * * Probably the most serious difficulty to adjust on either route, if the waterway should be constructed, will be to make satisfactory arrangements for railroad crossings. This is especially the case in the Mohawk valley, where the river is paralleled by the four tracks of the New York Central and the two tracks of the West Shore railroads." Ships must also be locked down from the summit level to the Hudson.

SLOW AND DIFFICULT NAVIGATION.

The distance from Oswego to the Hudson river via the Oswego-Mohawk route, low-level survey made by the Board of Engineers on Deep Waterways, is 172.87 miles, whose navi-

gation by war or large lake vessels would unavoidably be attended with expensive delays and difficulties so perplexing that no master or owner of any such vessel has ever advocated its construction. In 1896, Major Symons reported that a ship canal between the Great Lakes and the ocean would have no military value.

The distance via the high-summit level Oswego-Mohawk route is fully as long and navigation thereon would be attended with still greater obstacles, rendering it commercially unprofitable to operate large vessels 600 or more feet in length through such a restricted channel as that proposed by the Board of Engineers on Deep Waterways. Navigators of experience in handling large vessels in various channels, both artificial or natural, appreciate the difficulties of operating successfully such a waterway as that proposed and Congress is importuned constantly to make appropriations for river and harbor improvement to obviate the very difficulties incident to navigating restricted channels, such as the proposed ship canal must necessarily be. The annual appropriation for river and harbor improvement, ranged from 30 to 50 millions of dollars, which shows the extraordinary demands made upon the Federal government in the main to keep open and improve existing channels.

As already stated, the operation of such a ship canal through the state, with its large locks, would draw such enormous quantities of water from the several watersheds of Central New York, as to deplete the normal flow of its streams and involve the United States government in claims for damages for injuries to water rights along the Salmon, the Oswego, the Oneida, the Black, the Mohawk, the Hudson and other rivers running up into untold millions of dollars. The extent of such claims may be judged from the awards made and upheld by the Court of Appeals for the injury to water rights in the case of the Fulton Light, Heat and Power Company vs. The State of New York, 200 N. Y., 400. This phase of the matter ought not to be overlooked. Enormous compensating reservoirs would be required in the Adirondacks to keep up the flow of the Black, Mohawk, Hudson and other rivers.

EXTRAORDINARY DEMANDS ON WATER RESOURCES.

It became necessary to construct the Delta reservoir with a capacity of $2\frac{3}{4}$ billions cubic feet and the Hinkley reservoir

with a capacity of $3\frac{1}{2}$ billions cubic feet to supply water for the Rome summit level of the barge canal. The Delta reservoir is supplied by the water resources of a drainage area of 137 square miles, and the Hinkley reservoir by the water resources of a drainage area of 372 square miles.

The demands on the water resources of the state to supply a ship canal would be extraordinary and might exceed the resources of the watersheds. This is more evident now than it was in 1898, when the estimates were originally made for a ship canal, in view of barge canal operation requiring much more water than was contemplated.

MENACE TO STATE'S WATER SUPPLY.

A still more serious matter confronts the people of New York and that is the future water supply for its large cities. It has been stated by those who are more or less expert and familiar with the conditions, that in 25 years New York City must seek other sources of water supply outside of the Croton, Catskill and Long Island watersheds, as the demands of pure and wholesome water may then exceed the supply. It will then be necessary to impound the waters of the upper Hudson and its tributaries and those of other streams, having their unfailing sources in the Adirondacks to provide an ample supply for the needs of the millions inhabiting Greater New York. The acquisition of the Catskill watershed by the City of New York for additional water supply to that municipality is one of the large problems of the present age.

The water supply of cities is taxing the watersheds more and more and this shows the importance to which the water resources of the state are being devoted, as the population increases and the demands for wholesome water multiply. This is a problem of paramount importance to the health and existence of the millions resident in the state and a ship canal will not be suffered to exhaust the water resources that may be imperatively required for such domestic consumption and for municipal and other purposes.

Under all the circumstances hereinbefore stated and others considered, it does not appear to your committee that the arguments advanced for the construction of a ship canal between Lake Erie and Lake Ontario, justify its construction and operation as a political, naval or military necessity.

The New York state barge canals may readily be adapted to all necessary naval and military purposes as already proposed.

PROJECT AS A COMMERCIAL WATERWAY.

To gain 138 or 112 or 98.6 miles of open navigation on Lake Ontario, the distance depending on the place of entry into that lake, it is proposed to construct and operate a ship canal with 319.5 feet of lockage from LaSalle to Lewiston, distance of 8.34 miles, in addition to navigating the canalized river from Black Rock to LaSalle, a distance of 13.52 miles, or via another route to construct and operate a ship canal with 324.6 feet of lockage from Lockport to Olcott, a distance of 14.48 miles, in addition to navigating the canalized Niagara river and Tonawanda creek from Black Rock to Lockport, a distance of 24 miles, or via still another route to construct and operate a ship canal between Lake Erie and Lake Ontario with 326 to 330 feet of lockage between Lake Erie and the Niagara river as lengthy and expensive to construct, as either the LaSalle-Lewiston or the Tonawanda-Lockport-Olcott proposed ship canal. All estimates heretofore made are inadequate, both on account of the large canal now required to accommodate the Great Lakes' vessels, upwards of 600 feet in length and 60 feet in width, drawing 20 feet of water and also on account of the increase in the cost of labor and materials. Accordingly former estimates are to be superseded by the new estimates directed by Congress on July 27th, 1916, to be made.

The Niagara ship canal from Lake Erie or from the upper Niagara river to the lower Niagara river or Lake Ontario will range in length, according to various surveys hitherto made, from 18.21 to 64.79 miles, depending on the place of departure from the Lake Erie or the upper Niagara, the route followed and the place of entry into the lower waters, which are the lower Niagara and Lake Ontario.

The shortest of these routes is one-half as long as the Manchester ship canal and approximately half as long as the Panama canal and its lockage would be more than five times as great as that of the Manchester ship canal and more than three times as great as that of the Panama canal. The longest of the routes hitherto surveyed is one and one-half times the length of the Panama canal and two-thirds as long as the sea-level Suez canal. It may, therefore, be realized that the proposed ship canal between these lakes is a matter of great magnitude and must be approached with due consideration

of the engineering, hydraulic and financial problems involved in the project.

Little or nothing is to be gained by the use of such a waterway. The distance from the Niagara river to Oswego is 138 miles, from Olcott is 112 miles and from Ontario Junction, as surveyed by the Board of Engineers on Deep Waterways, is 98.6 miles. Those places, whence the measurement commences, are the several proposed lower termini of the ship canal, any one of which might become its actual terminus.

EXTRAVAGANT COST OF NAVIGATION.

The cost to the owner of a large lake vessel in navigating it through such a ship canal, down a flight of six or seven locks of 40 feet drop each and thence into Lake Ontario, would necessitate such an increase in freight rates as to more than offset the saving in freight rates on the short water haul through Lake Ontario of 138 or 112 or possibly only 98.6 miles. The delays unavoidably incident to the passage of a large, expensively built and costly operated vessels down and up through the proposed ship canal would entail so much expense on the owners of the vessels over and above what he would receive for freights on cargoes from Buffalo to Oswego via the Ontario route, that it is very problematical as to whether he would use the ship canal if it were constructed.

Major Symons, in his exhaustive report on the subject of the comparative advantages of various waterways, transmitted to Congress on July 15, 1897 (House Document No. 86 of the 1st Session of the 55th Congress) in substance, said that such a ship canal would not be generally used by Great Lakes' vessels, if it were constructed, but it might be used by barges of 1,500 tons capacity.

Ship owners and operators, like railway managers, must make expenses and something more for the upkeep of the vessels and realize some return on the large investment involved in their construction. They must estimate what they may reasonably expect to realize in a season of seven months of navigation. They must and do figure very closely to lose no time in port or in transit, for delays with large crews to feed and pay and other expenses to meet are very expensive, and ship masters, therefore, force their vessels through thick and stormy weather at their maximum speed of 12 to 15 miles per hour to avoid any loss of time and consequent loss in

earnings. That cannot be done in navigating ship canals, and navigators avoid them as much as possible, and many prefer to half circumnavigate Africa rather than be delayed by the frequent congestions in the Suez canal and to pay the enormous tolls exacted for such transit and necessary for its upkeep.

The Roosevelt Canal Committee reported that, "In a restricted waterway (referring to the proposed ship canal through New York) * * * we do not believe that ocean steamers or lake vessels could attain an average speed exceeding five miles per hour. * * * and that in order to be profitable the now (1900) existing rates on the ocean and lakes of about one-half of a mile per ton mile would have to be very largely increased." The rates must increase as the time consumed in transportation increases, for the operating expenses and interest in the investment in ships and in their equipment go on without interruption, regardless of the loss of time of vessels in passing through artificial waterways, or delays in ports.

The low Great Lakes' freight rates prevail only in the unobstructed open lakes, wherein large lake vessels may be crowded forward at the rate of 12 to 15 miles per hour. Much higher freight rates than Great Lakes' freight rates are inevitable for the transportation of cargoes on vessels passing through artificial channels, such as the proposed Niagara ship canal or a ship canal passing from the Great Lakes to the Atlantic ocean.

That is true also of vessels navigating sea-level canals and much more so of vessels navigating such artificial waterways as the proposed ship canal interrupted by numerous slowly operating locks of extraordinary lifts necessary to overcome the differences in elevation between Lake Erie and Lake Ontario of 330 feet and between Lake Ontario and the Rome summit level of 133 to 170 feet and between that summit level and the Hudson river of 379 to 416 feet, depending on whether the low level or high level route between Oneida lake and the Mohawk river be selected for such a ship canal.

NOT JUSTIFIED BY NECESSITY.

Experience the world over does not warrant the construction and operation of ship canals merely as commercial highways. Their construction is usually justified on the ground

of physical necessity, as in the case of the Corinthian, the Kaiser Wilhelm and the Panama canals, across narrow isthmuses of land separating large navigable waters, not otherwise readily susceptible of intercommunication. In such cases ship canals are justified, but for long distances, such restricted channels cannot be economically navigated by large vessels and any experienced navigator will so declare.

Major Thomas W. Symons, in his report submitted to the Congress of the United States by the Secretary of War on July 15th, 1897, contained in House Document No. 86 of the 1st Session of the 55th Congress, said that, "If the Erie canal be further improved (as is now being done) by enlarging it to a size sufficient for 1,500-ton barges, making necessary alterations in its alignment so as to give it a continuously descending all the way from Lake Erie to the Hudson and canalizing the Mohawk river, such improved canal, navigated by barges, will enable freight to be transported between the east and west at a lower rate than could a ship canal navigated by the large lake or ocean vessels. The cost of such enlargement would be approximately one-quarter the cost of a ship canal." The new barge canal is a continuously descending canal from Lake Erie to the Hudson river with the exception of the 57 feet lift from the Three-River Point to the Rome summit level, accomplished by three locks. It fulfills all the other requisites stated by Major Symons and has some features not outlined in that report.

The ship canal project from Lake Erie to the Atlantic, including a ship canal from Lake Erie to Lake Ontario, was also considered in 1899 by the Roosevelt Canal Committee, of which Gen. Francis V. Greene was chairman and of which Hon. Frank S. Witherbee, Major Thomas W. Symons, United States Engineer, Hon. John N. Scatherd, Hon. George E. Green, Hon. Edward A. Bond, State Engineer and Surveyor, and Hon. John N. Partridge, State Superintendent of Public Works, were members. That committee, among other things, reported on the ship canal project in part as follows:

"It seems to us that there are certain insuperable difficulties in the way of such a canal ever being a success, no matter by whom constructed. It is intended to be used by a vessel which can navigate the ocean, the canal and the lakes. We do not believe that such a vessel can be constructed so as to be economically and commercially successful."

The Chamber of Commerce and Commercial Union at Rochester in January, 1872, unanimously adopted the following preamble and resolutions in opposition to the project of the building of the Niagara canal, namely:

"WHEREAS, We have learned, with no little anxiety, that the project of the building of the Niagara ship canal has again been revived by western and eastern men, living out of this state, and who are joined by Oswego men, and

"WHEREAS, There being no demand for further facilities for the transit of western produce and eastern goods to and from the east and west and the old and new world—the canals of New York having kept pace with the demands made upon them and will for the next decade, if not two—if New York does her duty and puts them in complete navigable order and properly discipline the force to manage the same, and while this grand trunk channel affords facilities for all that offers and is prepared to accommodate at all times millions of tons more than now seeks transit through New York, therefore be it

"Resolved, That it is the sense and opinion of this Chamber of Commerce and Commercial Union of the State of New York, that it is most emphatically inexpedient at this time of the nation's financial condition to appeal to the exhausted treasury for aid to construct a work which would be the ruination of our canals and the commerce thereof, benefitting only the commercial interests of foreign nations, resulting as a sure and natural consequence in the diversion of traffic from American channels and home markets; ruining and blighting the material interests of our state, therefore it is hereby

"Resolved, That the Grand Erie canal, since its construction, has been the cheapest medium of transit and most direct route for commerce between the eastern and western states, vastly encouraging the settlement of the uncultivated territories. The canal has become a powerful balance wheel in checking and regulating the price between the producer and consumer. The Erie canal is susceptible with a moderate outlay of redoubling its carrying capacity,

"Resolved further, That in the event at any future time the Erie and Oswego canals should fail to meet the demands made upon them and the building of said ship canal becomes a necessity, that we deem it expedient for the state of New York itself to construct and retain the control of the same,

"Resolved, That this Chamber and Union enters its solemn

protest against the construction of this ship canal at this time or the granting of the right of way to the general government, and that we call upon each and every member of the Legislature to set their faces strongly against it and to defeat it and the foreigners from intermeddling with our internal affairs and the carrying trade of the state of New York."

\$154,800,000 INVESTED IN BARGE CANALS AND TERMINALS.

The New York Produce Exchange and the Chamber of Commerce of the State of New York at that time also formally opposed the construction of the Niagara ship canal. The conditions that now exist make the construction of such a canal between Lake Erie and Lake Ontario still more objectionable, for the state of New York is already obligated to expend \$154,800,000 for the barge canals, having a minimum bottom width of 75 feet and a minimum depth of 12 feet and a minimum water cross-section of 1,128 square feet, except at aqueducts and through cities and villages where these dimensions as to width may be reduced and cross-section of water modified to such an extent as may be deemed necessary by the State Engineer and approved by the Canal Board. In the rivers and lakes the canal may have a minimum bottom of 200 feet and shall have a minimum depth of 12 feet; the cross-section of water may be 2,400 square feet. The locks for the passage of boats on the Erie, Oswego and Champlain canals shall be single locks, except at flights of locks which shall be double locks. The locks shall have the following governing dimensions: Minimum length between hollow quoins, 328 feet; minimum width, 45 feet; minimum depth in lock chambers and on mitre sills, 12 feet, and with such lifts as the State Engineer may determine.

The dimensions of the prisms and locks of the new barge canals are greater than those of any of the earlier proposed ship canals between Lake Erie and Lake Ontario. They were decided upon after the most exhaustive investigations, commencing at an early date and including in addition to those already given the recommendations of Hon. Martin Schenck, State Engineer and Surveyor, in his annual report for 1892, namely, "The practical canal of the future, connecting Lake Erie and the Hudson river * * * ought to be one capable of bearing barges 250 feet in length by 25 feet in breadth of beam, of a draft not to exceed 10 feet and of such a height

that the great majority of bridges that should span this canal might be fixed structures instead of drawbridges," and also including those of Major Thomas W. Symons, United States Engineer, in his report already cited, comprising a lengthy review of the economics of transportation by water on all kinds of waterways by various types of vessels in this and other countries from their practical operation, thereby reducing the feasibility of such waterways as the barge canals to a certainty and also including those of the General Greene Canal Committee of 1899, embodied in its report, comprising the expert and the lay opinions of scores of shippers, vessel owners and authorities on transportation matters and the recommendations of waterway engineers, chambers of commerce and others, whose knowledge of the conditions and objects to be attained qualified them to speak on the subject.

CHEAP TRANSPORTATION ASSURED.

The cogency of the conclusions of that committee and the overwhelming popular vote in this state in 1903 on the \$101,000,000 first bond issue for the construction of the Erie-Champlain-Oswego barge canals to admit of navigation by vessels conveying from 1,500 to 3,000 tons of freight, as well as the later popular majorities on the \$7,000,000 bond issue for the Cayuga and Seneca barge canal, on the \$19,800,000 bond issue for barge canal terminals and on the \$27,000,000 last bond issue to complete the barge canals, ought to convince all, including ship canal theorists, that the state of New York, first in commerce of all the states of the Union, has for itself finally settled the problem of transportation by water through the state in the construction of its barge canal system, that insures as cheap transportation for domestic and through freights as can possibly be provided over any artificial waterway in the world, not excepting any ship canal, which type of canal State Engineer Martin Schenck declared in 1892 was not feasible between the Hudson river and the Great Lakes.

The late Gustav H. Schwab, American manager of the Oelrichs & Company Steamships, engaged in trans-Atlantic commerce and one of the best informed men on transportation on inland waterways, as well as the high seas, reported to the Greene Committee on Canals in 1899 as follows:

"By offering to barges of the capacity of 1,200 or 1,500 tons a quick means of transit through a commodious canal of the

size contemplated, a very material reduction can be gained in the transportation of bulk articles from the interior to the seaboard, which I believe you have correctly estimated at 1.8 mills per ton per mile.

"The only other alternative to be considered appears to be the fourth proposition in your letter, namely, the construction of a ship canal suitable for lake and ocean vessels of 5,000 to 10,000 tons capacity. Such a canal I believe to be removed from consideration, not only by the high cost, but also hold that the benefits that would flow from such a ship canal will not be commensurate with the enormous outlay and with the work. The style of vessel in use on the lakes is entirely different from that adopted for ocean transportation; neither style of vessel can be substituted or used for the other, nor can a vessel employed in the navigation of the North Atlantic successfully compete with the lake craft and *vice versa*, owing to the great difference in the mode of construction."

Mr. Schwab spoke from long experience in such water carriage, and on several occasions thereafter he publically advocated the barge canals in preference to all others, stating in substance that they were the better adapted for service in transportation between the Great Lakes and the Atlantic ocean. His practical knowledge did not permit him to be blinded to the obstacles which nature had interposed to the impeded navigation of ship canals with their necessarily restricted channels and flights of locks, in the case of the Niagara ship canal, half as high as the tower of the Metropolitan building in New York City and fully as high as the tower of the Electrical building in Buffalo.

The only parallel to such a canal is the Welland canal, now free of tolls on vessels owned by people in the United States and therefore rendering the construction of another canal between Lake Erie and Lake Ontario entirely unnecessary. The expense and delays, however, to vessels passing through the Welland canal have been such that only a limited number of vessels used that waterway, notwithstanding the fact that it leads into Lake Ontario and thence down the St. Lawrence river and through a few short canals to the ocean. That natural water route, with all the alleged advantages of a ship canal, has never been as generally used, nor transported as much tonnage as the old Erie canal.

But little weight should be given to the argument advanced

in the report of the Commission on Deep Waterways, namely: "If an ocean steamer could clear from an upper lake port to Europe, it would save the time and expense required to break bulk at two intermediate points and the cost of carriage would be about one-half of what it is now. Such a vessel could carry her cargo from the east end of Lake Erie to the ocean for not exceeding one cent a bushel for the additional water distance."

WOULD NOT LOWER FREIGHT RATES.

In answer to that stand, such expert detailed statements as the following of Major Thomas W. Symons, who has conclusively shown in his exhaustive report (House Document No. 86 of the 1st Session of the 55th Congress, page 81), comprising many tables of itemized expenses of vessels of various types that would navigate a ship canal from Buffalo to New York via the Oswego route, that the least cost of transportation of wheat would be 2.28 cents per bushel, or 76 cents per ton in large lake freighters of 20 feet draft of 7,000 tons capacity, making ten trips a season with full cargoes down and one-third cargoes of miscellaneous freights on return trips. Major Symons made an exhaustive investigation of all the facts entering into the resultant cost of such transportation and conclusively answers all such ill-advised opinions of laymen, unfamiliar with transportation problems.

Major Symons shows in that same report that the cost of transportation of wheat, including transferences at Buffalo from Buffalo to New York City via the barge canal route on barges of 1,500 tons capacity, in fleets of four boats, will be reduced to 2.07 cents per bushel or 69 cents per ton, which is seven cents per ton lower than the lowest ship canal rate via the Oswego route.

The Greene Canal Committee adopted Major Symons' estimates of the cost of transportation of wheat on 1,000-ton barges over the Erie canal, enlarged to barge canal dimensions, from Lake Erie to the Hudson river, which were eight-tenths of a cent per bushel or 26 cents per ton, equivalent to $\frac{1}{10}$ of a mill per ton per mile. That estimated cost of transporting grains or other tonnage over the new barge canals, now nearly completed, as well as other estimates of Major Symons, are based on a most careful study of the actual cost of transportation and on data procured from boat builders, canal boat-

men and from every available source, bearing upon the actual cost of running boats of different sizes. This last estimated cost, however, apparently did not include terminal charges at Buffalo of $\frac{1}{2}$ cent per bushel for elevating and 5 days' storage and New York. In 1897, Major Symons reported (House Document No. 86 of the 1st Session of the 55th Congress, pages 88-90) that the cost of transportation from Buffalo to New York, including trimming charges at Buffalo and shoveling charges at New York, on 1,500-ton barges, was estimated at 1.13 cents per bushel or 38 cents per ton. He said: "Comparing the ship canal with the Erie canal radically improved to accommodate 1,500-ton barges, we see an advantage of the barge canal with the business conducted in fleets as at present over the 5,000-ton ship of 25 cents per ton or \$6,000,000 per annum and over the 7,000-ton ship of seven cents per ton, \$1,680,000 per annum a mean advantage of \$3,840,000 with the Buffalo transfer charges remaining as at present.

"It may therefore be stated that the large barge canal would offer marked advantages to the shipper, even provided the Buffalo transfer charges remain as at present. As the barge canal would not cost more than one-fourth as much as the ship canal, its advantages as a business proposition are apparent."

The Congress of the United States was evidently impressed with the force of that report more than that of the Commission on Deep Waterways and more so, when the enormous expense involved in building and operating a ship canal was partially disclosed in the estimates therefor, made by the Board of Engineers on Deep Waterways and submitted to Congress in 1900. The government of the United States did not proceed with the construction of a waterway from the Great Lakes to the Hudson river, that was sure to entail an expenditure of \$200,000,000 and possibly \$350,000,000 to \$500,000,000 that was likely to be of doubtful practicability, if completed, as proposed. The problem of obtaining an ample water supply for the Oneida lake-Rome summit level was not easy of solution and was sure to fully tax, and possibly deplete for other purposes, the water resources of the watersheds tributary thereto. The economical and practical navigability of such waterway by large lake vessels is entirely problematical.

DELAY AND DANGER IN LOCKS.

The delays and dangers to vessels in locking down 330 feet into the Ontario basin through a flight of seven locks, each of $40\frac{1}{2}$ feet descent with chambers 650 or more feet in length and from 65 to 80 feet in width, with 22 to 30 feet of water over mitre sills, in addition to the $40\frac{1}{2}$ feet of water therein when filled, in such close proximity that a break in the uppermost of them would sweep away all other costly locks and flood the country below and possibly ruin the ship and cargo, and furthermore, in locking up from 133 to 170 feet from Lake Ontario to the Oneida Lake-Rome summit level through a succession of eight or more locks, depending on route, with lifts ranging from 20 to 42.8 feet and furthermore in locking from the Oneida Lake-Rome summit level down 379 to 416 feet to the tidewaters of the Hudson through a succession of 22 locks with lifts ranging from 11 to $21\frac{1}{2}$ feet and in winding down the canalized Mohawk river, hemmed in by double and quadruple railroad tracks and interrupted by railway and many highway bridges and on return trips passing through the same locks in inverse order, were so readily foreseen that neither vessel owners nor experienced shippers ever favored such a waterway.

In the meantime the state of New York prosecuted its investigations through experienced commissioners, legislative committees and otherwise and finally adopted the views of Major Symons, Gen. Francis V. Greene and others and by the popular approval of four referendum measures in succession, bonded itself to expend \$154,800,000 for the construction of its Erie, Champlain, Oswego, Cayuga and Seneca canals, aggregating approximately 450 miles in length with their terminals, such canals having the dimensions already stated, substantially as recommended by Major Thomas W. Symons in his report of 1897, but more especially recommended by the Greene Canal Committee in 1900 and subsequently approved in the passage and approval of the Canal Survey Law of 1900, and in the passage through the Legislature and ratification by the electors of the several referendum measures hereinbefore outlined.

Dr. Leo Symphor of Berlin, the leading authority in Germany on its navigable waterways, aggregating 8,570 miles in extent in 1905, expressed his opinion to the chairman of this committee in terms of unqualified approval, of the barge

type of canals for the purposes contemplated, which the state was about to construct.

The members of the International Congress of Navigation, comprising many of the leading engineers of Europe, inspected some parts of our barge canals in 1912 and lauded the great work New York was carrying to completion.

Authorities on inland waterway construction and operation the world over have pronounced them uniquely designed to secure the maximum efficiency in water carriage. They are the embodiment of the dream of State Engineer Martin Schenck, the realization of the ideal of Major Symons, and the final culmination of the masterful efforts of the Clintons and of the manifold activities of others, "whose number is legion," extending through the years to promote, as was prophesied by DeWitt Clinton a century ago: "The commerce of the ocean and the trade of the lakes passing through one channel, supplying the wants, increasing the wealth and reciprocating the benefits of each great section of the empire, * * *" producing a "canal as to the extent of its route, as to the countries which it connects and as to the consequences which it will produce, is without a parallel in the history of mankind." The foregoing prediction of DeWitt Clinton has already been verified.

For the foregoing and other reasons a ship canal between Lake Erie and Lake Ontario as a commercial waterway is not justified and in the opinion of your committee its construction and operation would involve the government of the United States in an expenditure of 50 or more millions of dollars without serving any substantial commercial purpose other than making it possible for a few vessels from the Great Lakes to descend into Lake Ontario, either to transfer their cargoes at Oswego to canal barges to be transported up over the Rome summit level 172 feet above Lake Ontario and thence down to the tidewaters of the Hudson river, or what is more likely to happen, to descend the St. Lawrence river to Montreal and divert thereto commerce from the port of New York.

Such proposed ship canal between Lake Erie and Lake Ontario, as already shown, would neither cheapen the rates of transportation nor expedite the transit of tonnage from the Great Lakes to the Atlantic ocean. Therefore your committee disapproves the project as a commercial waterway.

NO NECESSITY WILL BE SERVED.

From what has already been stated, it must be apparent to all that had there been any necessity—political, naval, military or commercial—for the construction of a ship canal between Lake Erie and Lake Ontario or any real interest in the project, which has engaged the attention of worthy people and many theorists during the past century, undoubtedly either the Congress of the United States would have been prevailed upon to build it, or some one of the several corporations, chartered for that purpose, would have gone forward with its construction.

The fact that neither the United States government nor any such corporation has done so, argues strongly against it. Rather than appropriate millions of dollars for the construction of such waterway, whose chief function would be to divert tonnage away from New York, it were far more statesman-like for the United States government to make a liberal contribution towards the cost of building the barge canals of New York which are destined to perform a most important service in the transportation of no small part of the products and commodities of a score of great states, bordering on the Great Lakes and on the Atlantic ocean, brought into navigable communication through such arteries of commerce.

Congress might well address itself to the matter of reimbursing the state of New York for its unprecedented outlay for the promotion of the domestic commerce of the United States, rather than expend its energies and waste the funds of the nation in waterway projects that tend to divert rather than promote such internal commerce. The state ought not to be forced to contribute to such projects and especially so after its good faith has been shown in its waterway activities, extending over more than a century of time. Congress might more wisely appropriate funds to improve the prisms of the barge canals.

Wherefore a strong protest should be made by the Buffalo Chamber of Commerce to the state of New York and to the Federal government in opposition to the construction of the proposed Niagara ship canal and an appeal might well be made by the state to the Congress of the United States for a substantial appropriation of money to the sinking funds of the state of New York, created to liquidate its canal bonded indebtedness.

We therefore recommend the adoption by the Board of Directors of the Buffalo Chamber of Commerce of the following resolution:

RESOLUTION ADOPTED.

Resolved, That the Buffalo Chamber of Commerce strongly opposes a survey for a ship canal between Lake Erie and Lake Ontario as directed by the Act of Congress of July 27th, 1916, on the grounds—

First: That the project is neither a political, naval, military or commercial necessity,

Second: That if it were constructed it would tend to divert commerce from the Great Lakes away from the state of New York down the St. Lawrence river, through the port of Montreal, to foreign markets, and largely that would be true, even though a ship canal were constructed from Oswego to the Hudson river, a distance of 172 miles, beset with many engineering obstacles and for whose operation an adequate supply of water may not be obtainable without depleting the water resources of the watersheds of Central New York, that are now needed for power purposes and may be imperatively demanded in the near future for municipal, domestic and potable consumption and for other domestic purposes,

Third: On the further ground that such ship canal would involve the expenditure of many millions of dollars, to which the state would be forced largely to contribute, despite the fact that the operation of such a canal would not cheapen the rates of transportation on tonnage passing over it below the rates of transportation on tonnage over the barge canals and would tend to divert business from the state and the port of New York,

Fourth: On the further ground that such a ship canal in operation might prove to be an impracticable waterway and very difficult to navigate, as it is quite generally believed by experienced ship owners and operators, and in that event the moneys expended in its construction would be entirely wasted,

Fifth: The state of New York is now providing what is considered the most modern and well-equipped inland waterways in the world, which are believed will afford as cheap rates of transportation as it is possible to obtain on any interior waterway and these will afford as expeditious transporta-

tion of the products, commodities and tonnage of the state and of other states in touch with the barge canal system and there is no occasion for the construction of the proposed Niagara ship canal or any other ship canal between the Great Lakes and the ocean.

In the foregoing, your committee has not considered the feasibility or expediency of a canal between Lake Erie and Lake Ontario for sewage disposal or power development purposes, which are entirely divorced from the Niagara ship canal project.

All of which is respectfully submitted,

Canal Committee,

Dated April 25th, 1917.

HENRY W. HILL, *Chairman*,
C. LEE ABEL,
HENRY V. BURNS,
EDWARD H. BUTLER,
SAMUEL J. DARK,
H. C. HARRISON,
MAXWELL M. NOWAK,
RICHARD C. O'KEEFE,
GEORGE W. SMITH,
HOWARD WINSHIP.

MSH 21239

**END OF
TITLE**